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ABSTRACT

The Environmental Education Project Center has developed these guidelines for teaching a unit in environmental studies. It is their intention that the teacher and student cooperatively plan the approach and content to be used during the course of study. In this unit about air, teacher resource information and student material are combined to form a teacher's manual for use in the intermediate grade levels. Project objectives and behavioral objectives introduce the unit followed by ideas, actions, and/or activities to develop awareness of air qualities and pollution effects. Major topics of discussion range from identifying sources and symptoms of air pollution to testing air quality and developing constructive action to combat pollution. Field trips emphasizing concepts previously learned are suggested and additional sources of information and materials for both students and teachers are listed. This work was prepared under an ESEA Title III contract for the project "Operation Survival Through Environmental Education." (BL)

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ENVIRONMENT

INTERMEDIATE
Idea 2
Air

TEACHER MANUAL

Title III
ESEA

"Operation Survival Through
Environmental Education"

Environmental Education Project

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ENVIRONMENTAL IDEAS

FOR THE STUDENT

-Air-

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I N T R O D U C T I O N

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ENVIRONMENT Idea 2 Air

INTERMEDIATE RESOURCE UNIT

The Title III, Environmental Education Project Center is providing your class with the following materials to teach a unit on air.

Student Manuals - 1 per student
Teacher Manual - 1
Supplementary Materials (as requested by the classroom teacher)

It is the project's intention to provide guidelines for the teacher and student to cooperatively plan the approach and content to be used during the course of study. All or part of the material can be used after evaluating the needs of the students.

The Environmental Education Project is evaluated by meeting objectives as outlined in the original project proposal. The resource units are written to meet these project objectives with additional material deemed necessary by the project staff, area teachers and administrators, and local environmental concerns.

A summary of the project objectives is provided to inform you of the areas being evaluated concerning the air unit. When using the curriculum materials, we urge you to teach toward these objectives.

- decrease in leaf burning
- decrease in use of trash burning barrels
- decrease in burning off areas of vegetation cover on fields
- decrease in use of pesticides in the homes, the gardens, and the fields
- decrease in the number of pounds of litter on a 50 foot section of Wood River Creek

- increase in use of litter bags in automobiles

- increase in the purchase of soft drinks in returnable containers

- increase in classroom use of films and filmstrips on environmental education

- increase in books and magazines relative to environmental problems checked out of school libraries and instructional materials centers

- increase in number of subscriptions to periodicals and other publications relative to environmental education

Students and families of students involved in the project are evaluated on the basis of the above stated objectives. Any different approach that you and/or your students might conceive that will further develop these objectives will be most welcome at the Project Center.

A concept-activity file is constantly being formulated at the Project Center to supplement the resource unit. Additional activities should be evaluated and used to increase motivation and interest depending on the students' background.

The concepts as stated in the original proposal are further stated in the field trip section. These concepts are primarily concerned with the air unit. Additional concepts should be developed to meet the needs of the individual teacher and students at the appropriate grade level.

Behavioral objectives are necessary to devise a method of evaluation and proper instruction. The following behavioral objectives are listed as a basis to follow in the teaching of the air unit. Additional objectives should be devised by the teacher as they apply to the individual needs of the students.

1. Students will relate the symptoms of air pollution to the class by constructing a display.

2. Students will list three methods for taking air samples.

3. Students will identify forms of air pollution by taking air samples.

4. Students will compare the quality of air with other resources using the E.Q. Index.

5. Students will list the major sources of air pollution in their neighborhood.

6. Students will complete diagrams illustrating the conditions for a temperature inversion.

7. Students will make and distribute bulletins on the dangers of air pollution and what individuals can do about it.

A pre-test and a post-test must be given to each student. Included in the teacher's packet of supplementary materials is the student test to be duplicated and distributed to each student. The teacher's answer sheet is included in this guide. After completion of the pre- and post-test, please grade and provide the Project Center with the test results. We would prefer the percentage gain for the entire class. Provide this necessary information by completing the teacher evaluation form.

The teacher's manual includes the actual student guide plus guidelines for the teacher to use while instructing students. Actions 4 and 5 are for your use in conducting field trips and determining what resources you want to use.

Not included in the teacher's manual are the transparency masters and the charts/forms for student use. These items are included in the teacher packet of supplementary materials. This arrangement will allow you to make multiple copies to distribute to your students. You are invited to obtain a teacher packet on a loan basis from the Title III Center. Our telephone number is 618-786-3313.

ENVIRONMENTAL IDEAS

FOR THE STUDENT

-Air-

Teacher's Answer Key

Grade the student responses using the following key. Look for key words or phrases and be flexible. The answers given are only possible suggestions. The students will give additional answers that are correct. Point values are placed in parenthesis before the question. Tabulate the results of the pre- and post-test and submit to the Title III Center on the teacher evaluation form.

(30) 1. How does air pollution effect these items?

a. plants-YELLOWISH, BROWN SPLOTCHES ON LEAVES; EVENTUALLY DIE

b. stone-SURFACE FLAKES OFF AND CRUMBLES

c. rubber-BECOMES WEAK AND BRITTLE

d. crops-STUNTS GROWTH

e. lungs-EMPHYSEMA AND OTHER DISEASES

f. paint-COLOR IS DESTROYED

(10) 2. Devise a way to take air samples to see if the air is polluted.

THE STUDENTS COULD WEAR FACE MASKS, USE VASELINE SLIDES, OILY CLOTHS, OR USE CHEMICALS FOR GASEOUS POLLUTANTS.

(10) 3. When you burn a fuel like coal, what pollutants are given off?

CARBON DIOXIDE AND WATER ARE THE NON-POLLUTING ELEMENTS IF COMBUSTION IS COMPLETE. HOWEVER, PARTICULATE MATTER SUCH AS SOOT IS EMITTED IF COMBUSTION IS NOT COMPLETE. ALSO GASES LIKE SULFUR DIOXIDE AND NITROGEN OXIDES ARE GIVEN OFF.

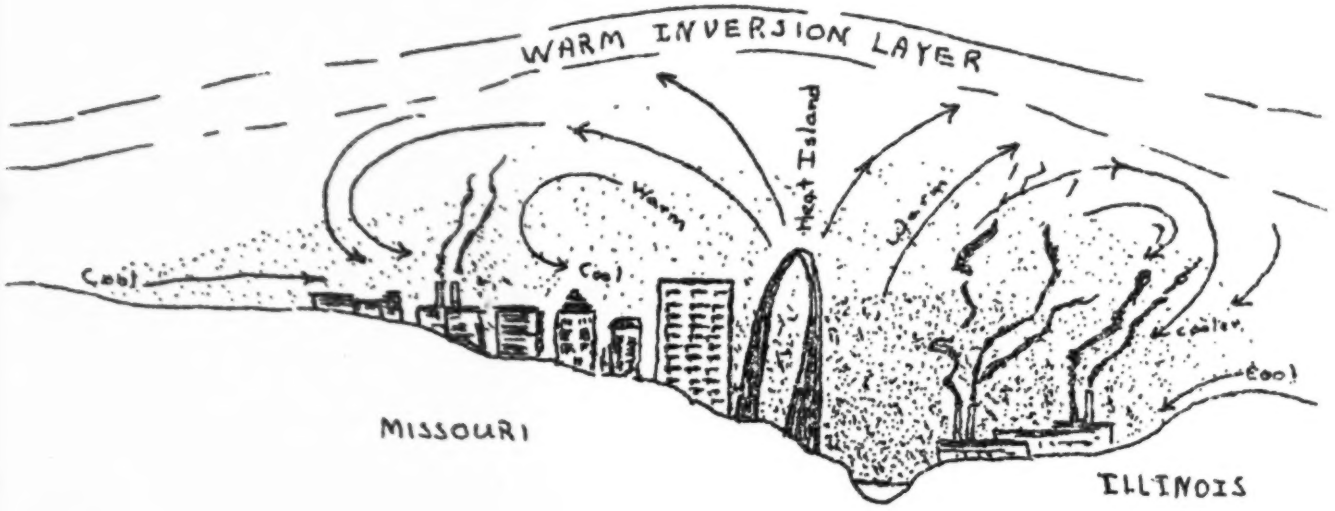
(10) 4. Quality is how good something is. The quality of air, wildlife, soil, and water can be measured. Put these resources in the order of quality.

SOIL	WILDLIFE	WATER	AIR
highest quality			lowest quality

(10) 5. Check the sources of air pollution that could occur in your neighborhood.

X car exhaust	X burning off vegetation
X trash burning barrel	X industry
X burning of leaves	X home heating units
	____ crop dusting
X wind blown dust	X pesticides on lawns or gardens

(10) 6. Use wavy lines to show sources of air pollution. Use arrows to show what happens to the pollutants that cannot escape through the warm air layer.



(10) 7. In the above drawing, what happens to the air pollution if the wind is from the west?

THE AIR POLLUTION WILL MOVE TO THE EAST.

(10) 8. Check the things you can do as a student to help fight air pollution.

X stop burning leaves	X stop burning trash
X ride a bicycle instead of a car	X read about air pollution
X report air pollution offenders	X do not use pesticides

X inform adults of their errors in creating air pollution

ENVIRONMENT

Idea 2
Air

ENVIRONMENTAL IDEAS FOR THE STUDENT

This guide to environmental ideas is provided to give you a better understanding of some of the environmental problems you will face in the future. It is also written in such a way that you will be able to make your own value decisions about what has to be done to maintain and improve the world in which you and all of us live. The interest that you have is directly related to the amount of involvement that you give in the solution to the problems of our surroundings.

This guide will be used by other students. Please keep it in good shape and avoid marking this guide. Use notebook paper for answering questions, copying charts, or other tasks called for on the following pages.

ENVIRONMENT

Idea 2
Air

Action 1

An Onion a Day!

Even an onion a day won't keep the smog away. What will keep the smog, or air pollution away? Many things will keep it away, but first we must know what air pollution is and why air pollution is harmful.

A. Symptoms

You can find out what air pollution is by observing the symptoms of air pollution. Observe what air pollution does in the classroom and on the school grounds.

THE FAMILY CIRCUS By Bil Keane

"This air smells funny -- I guess it doesn't have enough PLUTION in it."

WHAT DOES IT DO TO...?

Green Valleys

The Leaves of a Plant

Metals--Stone--Marble

Paper--Leather--Rubber

Paint--Fabrics--Fibers

The Growth of Plants

Crops--Flowers--Fruit Trees

Eyes--Lungs--Heart

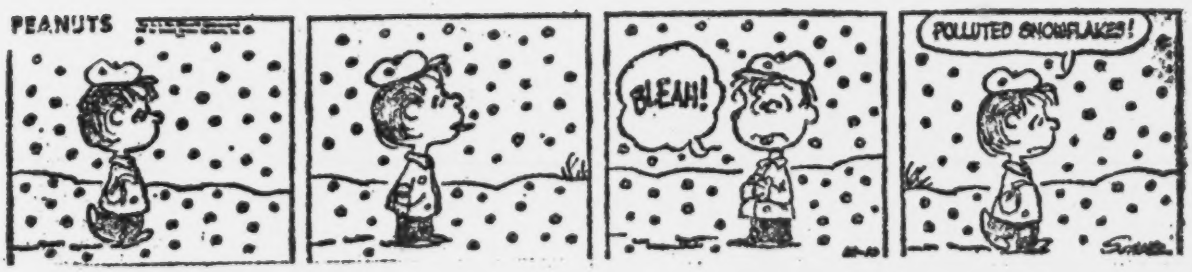
As a class, make a display showing these effects of air pollution. Bring an article to class that shows signs of air pollution damage. Are you sure these items are damaged by air pollution or just weathering? Take pictures of items too big to bring to class. Make an A.P.C. (air pollution collage) from pictures and news headlines. Your teacher will help you on this one!

B. How Much Is Too Much?

If you find symptoms of air pollution in your community, you have a problem. In other words, you must have too much. Too much what? Let's find out!

Particulate Matter

Your teacher will demonstrate this activity. Watch what happens when your teacher strikes a match. Is there any black smoke? Does black smoke add to the air pollution in your community? Define <u>combustion</u>. Is combustion the major source of air pollution? What are some of the products of combustion? Is particulate matter the only product of combustion?



Gases

Your teacher will burn some coal with a high sulfur content. What do you smell? How does this contribute to air pollution in your community? What other invisible gases cause odors in your community?

C. Let's Find Some!

Gases are very difficult to collect. However, you can collect particulate matter very easily. Read each approach on how to collect particulate matter. Which one do you want to try?

The Lone Ranger Approach

Take a clean white cloth and make a face mask to cover your nose and mouth. Wear the mask at least half a day. Check the cloth for particulate matter. How much discoloring of the cloth was there? Where would the particulate matter go, if you were not wearing the mask?

The Sticky Slide Approach

Label six microscope slides with the date, location (test site), and your name. Smear the slides with vaseline. Put these slides in a safe place (above ground level) throughout the school. Gather these slides after several days and compare the amount of particulate matter. Which location had the most particulate matter? Which location had the least?

The Super-Vac Approach

Materials Needed

1 Vacuum sweeper with a hose

2 White cloths (6" x 6")

1 String (12")

Vaseline, or household oil

Assemble the equipment so that air can be drawn through the white cloth. Draw classroom air through the white cloth for at least thirty minutes. Hang the hose out the window and draw outside air through another clean white cloth for at least thirty minutes.

1. WHAT AIR POLLUTANT ARE YOU SAMPLING?

2. IS THIS SIMILAR TO THE LONE RANGER APPROACH?

3. CAN THIS BE DONE AT HOME?

The methods you used in sampling air were simple and inexpensive. Cities that sample air at regular intervals use complicated and expensive pieces of equipment. Are there air pollution monitoring stations located in your area? Who operates and maintains these air monitoring stations?

TEACHER'S GUIDE

ACTION I

Part A: Symptoms of air pollution damage would include:

1. leaves with distinct narrow, reddish-brown lines of dead tissue
2. leaves with splotches
3. metals deteriorate faster; e.g. copper and aluminum (5 times faster than normal), iron (6X), brass (8X), zinc (15X), nickel (25X), and steel (30X)
4. stone flakes off and marble crumbles
5. paper becomes brittle and leather disintegrates
6. color in paint and dyed fabrics is destroyed
7. fibers weaken
8. plant growth is stunted
9. damages fruit trees and ruins crops
10. damages lungs.

For the A.P.C. (Air Pollution Collage), arrange pictures and news headlines on construction paper before pasting with white glue. Have a show and tell period by each student. Also make posters showing air pollution and its effects. Look in newspapers and magazines for articles and pictures.

Part B: Demonstrate the particulate matter from combustion. You can expand on this activity by using different materials. Light a propane torch and observe the flame. Little particulate matter should be observed because this is complete combustion. The products are carbon dioxide and water. Hold clean white plates over a burning pine splint for several minutes. CAUTION: the plate gets hot. Observe the soot on the plate. Repeat using the propane torch. The Title III Environmental Education Center can provide the propane torch by calling 618-786-3313.

Obtain some high sulfur coal and burn it in a test tube. The gas will smell and yet it is invisible. In other words, not all air pollution can be seen.

Part C: The Lone Ranger Approach

If any particulate matter is present, it should be visible on the white cloth. You might use a magnifying lens to observe large pieces of particulate matter.

The Sticky Slide Approach

Use gummed labels or marking pencils for each slide. If slides are not available, use index cards or any flat surface. Any oily substance can be substituted for the vaseline. After several days, or a week, compare the slides using the naked eye or a magnifying lens.

The Super-Vac Approach

Attach the oily cloth to the nozzel of the vacuum sweeper. You will be sampling the air for particulate matter. The particulate matter will include dust, soot, smoke, and bacteria. This method is similar to the lone ranger approach except that it draws a greater volume of air in a shorter period of time.

An extension of this approach would be to allow each student to conduct his own experiment at home. The students should bring the cloths to school and compare results. One assignment could be to draw trash burning air through the cloth using the vacuum sweeper.

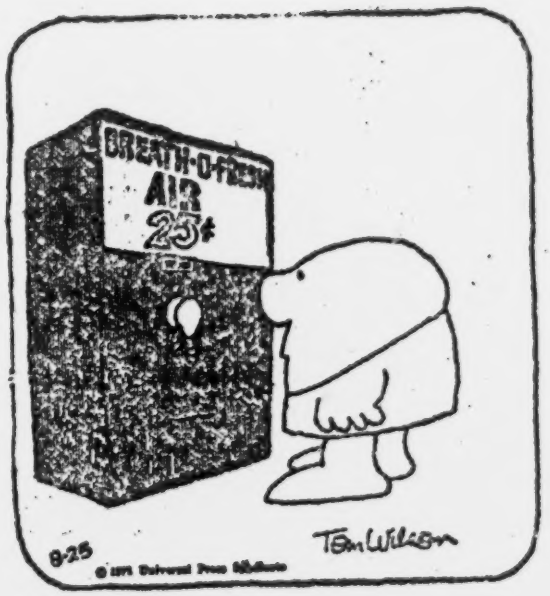
The only air monitoring stations are located in the Alton-Wood River area. These are operated by officials from the State of Illinois.

ENVIRONMENT Idea 2 Air

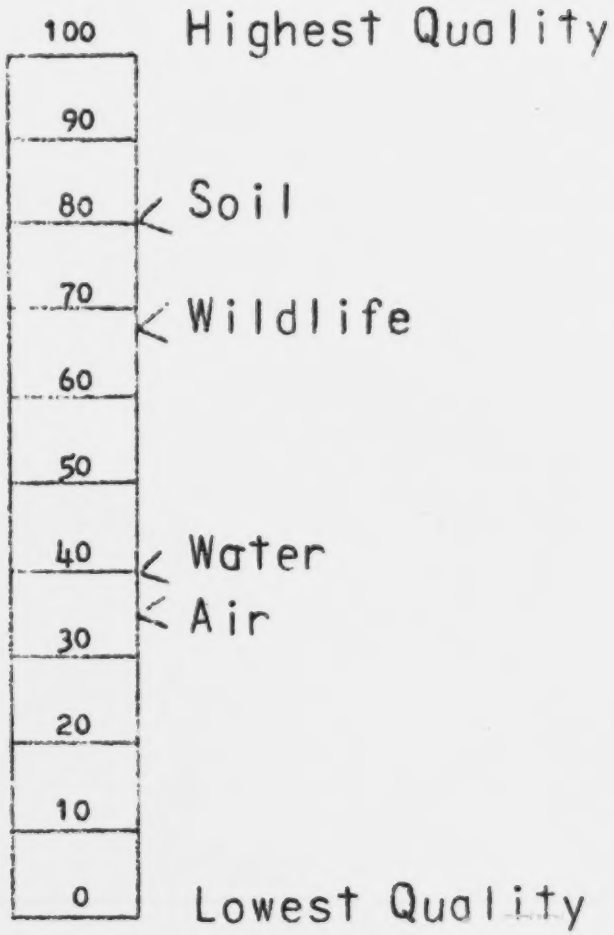
Action 2

It's Got to Get Better!

ZIGGY



A recent environmental quality chart showed air to be of the lowest quality when compared to water, soil, and wildlife. Since 1966, the United States has increased its air pollution by five million tons each year. Air pollution is worse over cities, but it is beginning to affect the entire atmosphere.



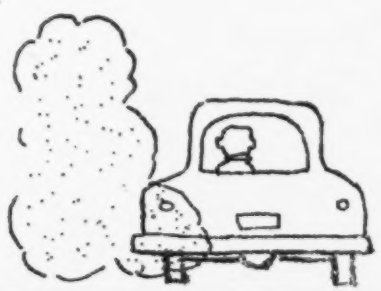
ENVIRONMENTAL QUALITY CHART

A. That's a Gaser!

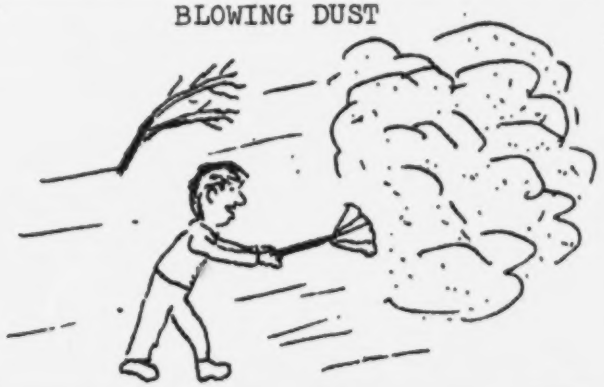
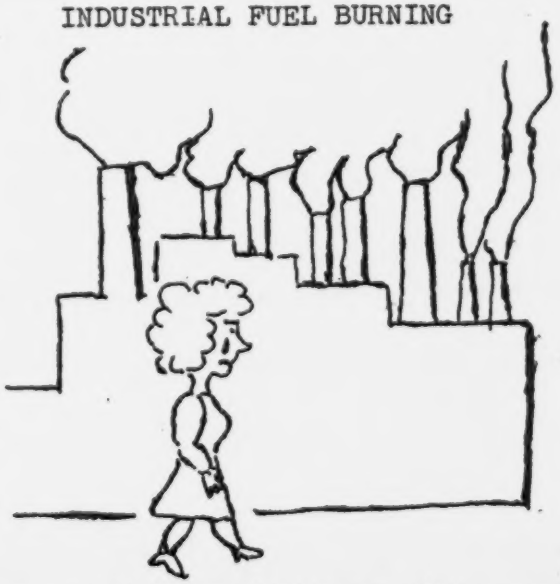
We all pollute the air in one form or another. Our job now is to find out the source of air pollution. The next few pages are check lists of common forms of air pollution caused by man. Complete the chart provided by your teacher. <u>Do not write in this booklet</u>.

QUINCY
By Ted Shearer
YA SEE THAT SMOKESTACK?
YEAH, WHAT ABOUT IT?
2-10
IT LIKES US BETTER THAN ANY-BODY ELSE.
HOW DO YA KNOW?
NO MATTER HOW LITTLE SMOKE IT HAS, IT ALWAYS SENDS US SOME...

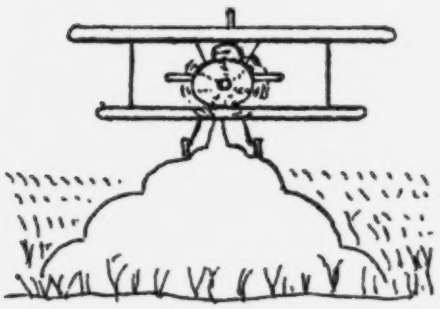
Air Pollution
Score Chart

Air Pollution Source	Record of Information
CAR EXHAUST 	____ The number of cars that pass your house from 4:30-4:35 p.m.
TRASH BURNING	____ The number of trash burning barrels located in your block, or within 50 yards of your home.
BURNING OF LEAVES	____ The number of families in your block, or within 50 yards of either side of your house, that burn leaves.

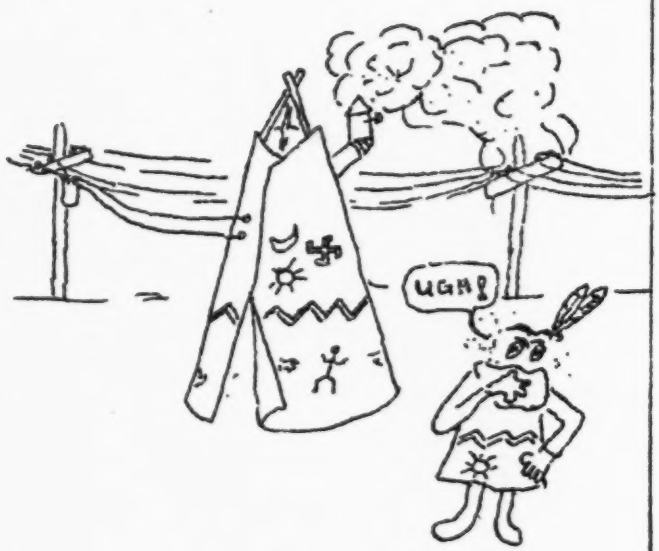
Air Pollution
Score Chart

Air Pollution Source	Record of Information
-- BLOWING DUST 	____ If at any time during the past year you could see blowing dust, add 1 point.
BURNING OFF VEGETATION	____ If your family or neighbors burn off the vegetation, add 1 point.
INDUSTRIAL FUEL BURNING 	____ If you can see from your home a factory emitting smoke or dust, add 8 points.

Air Pollution
Score Chart

Air Pollution Source	Record of Information
CROP-DUSTING & SPRAYING 	____ Add 5 points if crop dusting has been seen from your home within the past year.
HOME & GARDEN SPRAYING	____ Add 1 point if your family uses pesticides. ____ Add 3 points if crops on your farm are sprayed.

Air Pollution
Score Chart

Air Pollution Source	Record of Information
HOME HEATING 	_____ Record the number of homes emitting smoke in your block or within 50 yards on either side of your home.

After all scores have been obtained, compare and discuss the differences. Would you use the results of this survey in selecting a place to live? Does the source of air pollution affect the development of areas into recreational, residential, and downtown districts? Would you rather live east or west of a large city? Why?

B. A Stitch in Time...

Now that you know the sources of air pollution, it is time to think of a better way of doing things to avoid polluting the air.

Divide your class into nine groups. Each group will select one of the nine pictures in Part A and answer the following questions:

1. IS THIS NATURAL OR MAN-MADE POLLUTION?
2. IS THIS PROBLEM LIKELY TO WORSEN OR LESSEN IN THE FUTURE? WHY?
3. ARE THERE OTHER WAYS OF HANDLING THIS PROBLEM? WHAT ARE THEY?
4. IS THE NEW WAY TOO COSTLY?
5. WILL THE PUBLIC ACCEPT THE NEW WAY?
6. WHAT ACTION CAN <u>YOU</u> TAKE <u>NOW</u> TO PUT YOUR NEW WAY INTO USE?

TEACHER'S GUIDE

ACTION 2

The Environmental Quality Chart is taken from the October-November, 1970, issue of the National Wildlife Magazine. For a free copy of the E.Q. Index, write the National Wildlife Federation, Educational Servicing, 1412 16th Street, N.W., Washington, D.C. 20036. A staff member at the Title III Environmental Education Center can also provide a copy on a loan basis. Call 618-786-3313.

Part A: Making students aware of air pollution in their community is very important. This awareness will be accomplished by letting the students take a survey of their neighborhood. A master is provided in the teacher's packet for you to duplicate and provide each student with a copy.

At the conclusion of the survey, compare the results. Discuss differences as related to geographical location (east or west of source, and rural or urban), zoning (residential, business, or industry), and state, county, or city laws governing air pollution.

Part B: Challenge the students to think of alternatives for processes that cause air pollution. The depth you want covered is up to you. Ideas to expand this activity could include developing content and drawings detailing the process. The students could present this to a test audience. Models, charts, and displays could be instructed.

The most important point would be to have the students initiate more feasible methods of change. Your own initiative and inventiveness should be used for an exciting and meaningful activity.

ENVIRONMENT Idea 2 Air

Action 3

Weather Bulletin

Due to a stationary high pressure air mass over the St. Louis metropolitan area, the amount of air pollutants present has reached a level dangerous to human health. It is recommended that all individuals remain indoors as much as possible and breathe only filtered air until the present air mass is blown to the East.

A. Nature Puts the Lid on a City

A temperature inversion is a weather condition that can occur at any time in any place. It generally occurs when a huge high pressure air mass stops over an area.

BROOM HILDA

Your teacher will supply you with a diagram of a temperature inversion. Find out what a temperature inversion is and then label and complete the diagram.

1. Label the air masses as warm or cool.
2. Draw the emissions from the sources of air pollution.
3. Use arrows to show the path of rising air pollutants.

As a class, discuss the results of temperature inversions.

1. Which air mass acts as the lid?
2. What happens to air pollution in normal weather conditions?
3. Does the air pollution increase or decrease during a temperature inversion? Why?
4. Has a temperature inversion ever caused serious injury to man?

ANIMAL CRACKERS
THERE'S NOTHING LIKE STANDING ON A HILL AND LETTING THE BREEZE RUSH THROUGH YOUR HAIR...
.. SINCE TIME IMMEMORIAL, IT HAS BEEN ONE OF LIFE'S GREAT PLEASURES.
... ONLY DIFFERENCE IS... TODAY, YOU'VE GOT TO RUN HOME AND SHAMPOO AFTERWARDS!..

B. Down in the Valley

Spanish explorers noted haze from Indian campfires hung over the Los Angeles basin. This was due to a temperature inversion. What kind of inversion was this? Your teacher will give you two diagrams. Label and complete the diagrams as follows:

1. Label the air masses as warm or cool.
2. Draw the emissions from the sources of air pollution.
3. Use arrows to show the path of rising air pollutants.

As a class, discuss the normal and inversion conditions that exist in a valley.

1. Do the air pollutants rise and dissipate in a temperature inversion?
2. What conditions cause a constant temperature inversion?

C. Air Pollutants Can Cause Rain

In recent years, there has been an increase in rainfall in an area east of St. Louis, Missouri. Could this increase be caused by air pollution?

Nature provides an overabundance of particles for cloud formation by adding air pollution. Could this addition of particles change the pattern of cloud formation and rain?

1. What does a drop of rain have as its center?
2. How does air pollution affect the formation of raindrops?
3. If weather moves from the west to the east, where would you expect rain caused by air pollution to fall?

D. What Can I Do?

SHORT RIBS **By Frank O'Neal**

OH DEAR, MY BREW IS BURNING!
IT'S SPOILED!
I WON'T BE ABLE TO CAST ANY SPELLS WITH THIS MESS.
BUT AT LEAST I CAUSED SOME AIR POLLUTION.

Most important is that you do not cause any air pollution.

Find out if there are local citizen groups engaged in helping to keep your town clean; such as, garden clubs, chamber of commerce, industrial groups, churches, youth groups, civic and service clubs, and conservation and wildlife groups. Give these groups support for any air pollution control programs.

Report air pollution nuisances to proper authorities as soon as you discover them.

What else can you do?

TEACHER'S GUIDE

ACTION 3

Part A: A temperature inversion occurs when cool surface air is trapped by an upper layer of warmer air. The air near the surface of the earth is literally trapped. As a closed-off area, the air pollutants emitted will not rise and dissipate as in normal conditions. If this condition continues, a level will be reached that is dangerous to plants, animals, and man.

Duplicate the master diagram found in the teacher's packet of supplementary materials. Provide each student with a copy. A completed copy is provided in this teacher's guide for your use.

Answer Key to Questions

1. The upper warm layer of air acts as the lid.

2. Air pollution would rise with warm surface air and dissipate under normal weather conditions.

3. The air pollution would increase because the lid is keeping all the pollutants near the surface of the earth.

4. Temperature inversions have caused serious injury to man. Many deaths occured in Donora, Pennsylvania, October 1948, and London, England, December 1952.

Part B: Constant temperature inversions occur in valleys. The sun's rays warm the upper layer early and late in the day. This causes a lid over the basin to trap pollutants. Mid-day, the pollutants escape due to the sun's vertical rays.

Duplicate and distribute to the students the two diagrams provided in the teacher's packet of supplementary materials. Completed diagrams are provided in this teacher's guide.

Answer Key to Questions

1. Air pollutants do not rise and dissipate during a temperature inversion.

2. Landform conditions, such as valleys and basins, cause a constant temperature inversion.

Part C: Answer Key to Questions

1. A drop of rain has as its center a particle of dust to which the water adheres.

2. The particulate matter rises and saturates the clouds. Water forms around these particles into raindrops. The excessive number of these particles allows a great deal of rain to form.

3. Rain, caused by air pollution, usually would be carried to the east of the city as weather systems normally move from the west to the east.

Part D: An extension of this activity could be a drawing exercise. Your class could develop a drawing book for primary grades. You could also present the drawings to the local city council, chamber of commerce, or newspaper.

ENVIRONMENT Idea 2 Air

Action 4

"Let's Go on a Field Trip!"

A field trip is to be taken during your teaching of the air unit. The field trip is an integral part of the air unit. It emphasizes the concepts learned, or to be learned by the students. On-the-spot observation is a valuable learning technique. Consult the "Teachers' Policy Handbook" for field trip dress, discipline, and general instructions.

A. Concepts Are Important.

Mind filling, factual, see-all field trips have been a traditional approach to the field trip in the past. The question is, "Is the child given any responsibility for learning on his own?" Does he retain more from being spoon-fed facts or from being allowed to learn from his own interest and involvement?

Experience and research indicate that children learn more when they become personally involved in the learning process. This can be achieved by allowing the child to participate in the initial planning of the field trip, and to select a specific investigation on the field trip for which he will be responsible. These specific investigations will be within the bounds of the concepts to be presented on the field trip and in the unit.

The concepts below are only a few of the many that students should come to understand when learning about the environment. Additional concepts may be emphasized at the teachers' discretion. The concepts to be presented are as follows:

1. Air is a natural resource.
2. Man is dependent on the renewable resources for his survival.
3. Everyone has the responsibility for conserving the air around him.
4. Living things are interdependent with each other and with their environment.
5. Change is the only constant of our environment.

B. Where Are the Sites?

The above concepts can be illustrated at a number of field sites. The actual field trip site choice should result in a discussion with your students. Let the students feel a part of the final decision. Their interest will be enhanced by your concern over their choices.

Suggested field sites would include:

1. air pollution monitoring boards
2. busy intersection
3. school parking lot
4. industrial sites.

C. Let's Experiment!

Three options are presented for the teaching of these concepts. These options vary in degree of the student's responsibility for learning. They vary from teacher planning activities for the student, to student-teacher planning, to total student planning. These options can be combined or used independently. The options are as follows:

1. Teacher Planning for Student

The teacher will present activities to be assigned to students or chosen by the students on a voluntary basis. The students should be encouraged to brainstorm additional activities to enlarge on those being suggested. The only caution would be to contain the brainstormed activities as they apply to the concept being taught. Those activities are listed following this section on teaching options.

2. Student-Teacher Planning

With this procedure the list of concepts is to be presented to the students for class discussion. The discussion should establish an understanding of these concepts. At this point, the students should be guided into a brainstorming session to bring out field trip activities and assignments as related to the concepts. The teacher, in guiding the development of the field activities, may care to provide some direction by giving suggestions of activities as they are listed at the conclusion of this teaching option section.

3. Student Planning

The student in this procedure will be totally responsible for his plan of study of the concepts given to him by the teacher. Initially, the teacher will work with the student in developing a study agreement. The study agreement will cover the following points:

a. title of study
b. questions to be answered in conducting the study
c. resources to be used
d. description of field activity
e. field activity equipment and supplies
f. method of recording data
g. form the report or summary will take (written-oral-audio & visual)
h. how and who will evaluate the report

The carrying out of the field activity may be either on a student self-directed basis on free time or as a part of the class field trip.

Suggested Field Trip Activities

Methods of procedure in carrying out these activities should be carefully planned and reviewed in preparation for the field experience. Considerations to be made are:

a. equipment or supplies needed to carry out the activity
b. method of recording the data to be gathered
c. method of recording the data in a meaningful way
d. follow-up activities that will extend and strengthen the concept.

Let's Make a Movie!

Student interest and creativity is greatly enhanced by doing something different and productive. You and the students must work together for the project to be successful. A lot of class time will be spent in preparation of this activity.

Some planning questions might include the following items!

1. How about making a movie of air pollution?

2. Can we list on the chalkboard some of the things that should be in our movie?

3. What facts should we tell people?

4. What can each of us do to make the movie a success?

Determine the format of possible scenes and begin actual planning.

You will need the following equipment:

Movie camera (1 per class or group of students)
Film (black & white or color)
Light meter (optional)
Tripod (available through the Title III Center)
Editing equipment
Projector and screen
Notebooks

Check with students, audio-visual centers, or local merchants for use of equipment. You may want to put sound with the film production. Students voices on tape recordings are very rewarding. Casette tape recorders are available through the Title III Center. Contact a staff member or call 618-786-3313.

The following procedures are entirely at the teachers discretion.

1. Determine the suitable areas and proper sequence.

2. Students should work in interest groups.
   a. care and cleaning of equipment
   b. areas and content to be filmed
   c. audio narration
   d. actual filming
   e. arrangements for film development

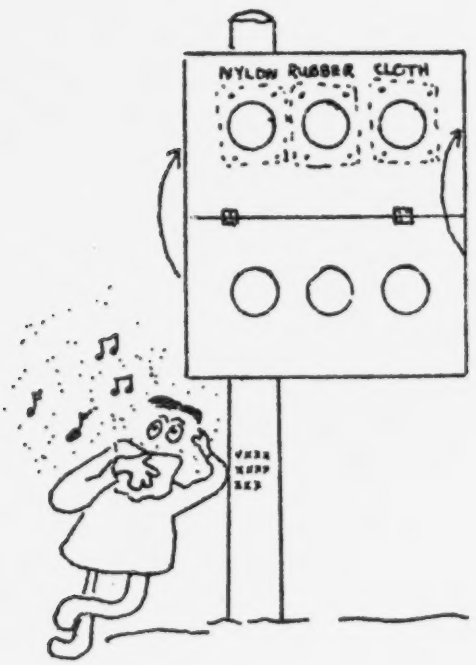
3. Make all arrangements before going into the field for filming.

Make sure students using the equipment are well versed and capable of handling expensive equipment. Use the final product as a teaching and public relation device. Student assemblies and P.T.A. groups are interesting audiences.

Alternatives!

If film making is too complicated, expensive, or advanced for your needs, consider the following suggestions.

Activity 1 - The Wind Sieve Approach



Field trip sites have been established in the local districts. If you are unable to visit these sites, you should construct your own. The diagram on the left will aid in this construction. Materials placed in the openings will be exposed to possible air pollutants. Materials used could be nylon, rubber, oily cloth, or plastic. Any deterioration of the material will be caused from elements in the air. Exposure time should be at least two weeks.

At the location of the board, observe possible sources of air pollution. Survey the area by counting the number of smokestacks, trash burning barrels, burned off areas of vegetation, and auto traffic. How does this number effect the deterioration of the materials?

Construction of a wind sieve board includes two cardboard or plywood sheets, approximately 24" by 12", with holes approximately three to five inches in diameter. Attach the board to a post in such a way that one-half of the board drops down for ease of changing materials. The unexposed material will act as your control.

The following are expected effects of air pollution acting on each of the materials:

Nylon - the threads will deteriorate - nylon is affected most by airborne acids (sulfuric and nitric acid) and ozone

Rubber and plastic - these materials become brittle and crack, caused by ozone.

Vaseline or oil coated cloth - airborne particles will adhere to the cloth and can readily be seen.

Activity 2 - The Lone Ranger Approach (in the field)

This activity is similar to the classroom activity. Before going on the field trip, ask a student to wear a face mask containing a filter pad during the length of the trip. While on the trip, observe the filter several times for particulate matter. After the trip, remove the filter and observe through a hand lens the possible particulate matter. Compare the results with an unused filter. What happens to the particulate matter if you do not breathe through the filter?

Activity 3 - Car Exhausts

Use vaseline coated cardboard squares to collect emissions from different auto exhausts. Hold the squares at a safe distance from the exhausts while the owner (or authorized person) starts the automobile. Label the cardboard squares with the make, model, and year of the automobile. In the classroom, compare and discuss the results of this activity.

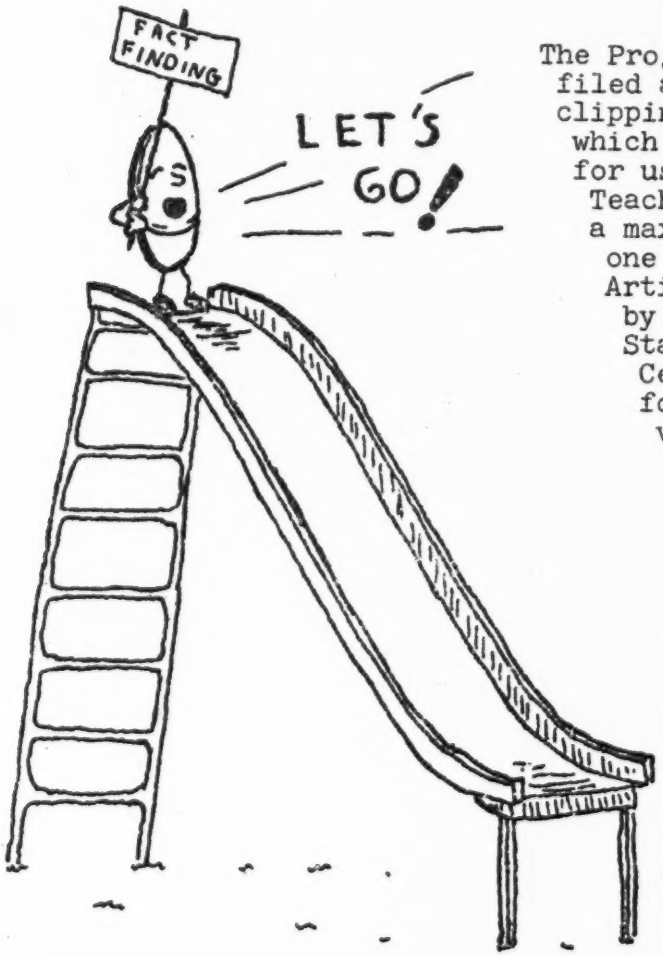
ENVIRONMENT Idea 2 Air

Action 5

"Use Resources to Reach Greater Heights"

Often teachers desire additional reading material, visual experiences or discussions to enrich a student's learning experiences. Listed below are materials which may be borrowed from the Environmental Project Center, area resource people, and area film dealers. This listing, however, does not include resources which may be found in local school or public libraries.

A. Resources Made Easy



The Project Staff has accumulated and filed a number of pamphlets, newspaper clippings and magazine articles which are available to teachers for use as resource material. Teachers may borrow, for two weeks, a maximum of four articles from any one heading in the vertical file. Articles may be obtained by mail, by contacting one of the Project Staff or by calling the Project Center at 786-3313. The following headings appear in the vertical file.

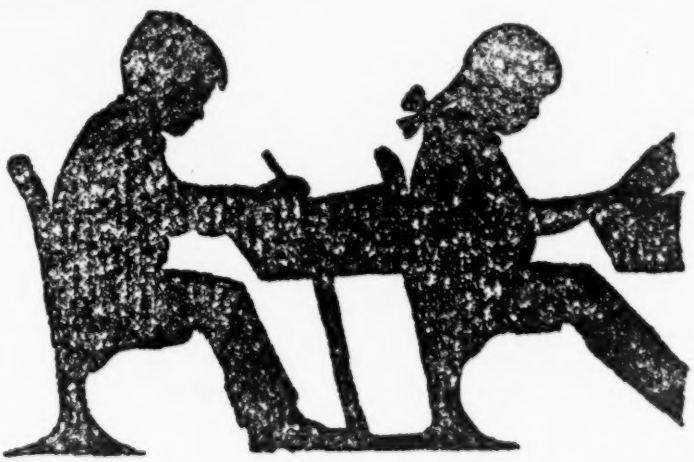
1. Air Pollution
2. Air Pollution - Control - Equipment
3. Air Pollution - Control - Individual
4. Air Pollution - Control - Industry
5. Air Pollution - Health
6. Air Pollution - Internal Combustion Engine
7. Air Pollution - Monitoring
8. Air Pollution - Primers
9. Algae - Airborne
10. Conservation - Water & Air

11. Conservation - Windbreaks
12. Energy
13. Gov't Control - Federal - Air
14. Gov't Control - Federal Illinois
15. Lead
16. Mercury
17. Natural Resources
18. Noise
19. Oxygen
20. Pollution - Industrial
21. Solid Waste
22. Transportation

B. Multiple Student Materials

The Project Center also has multiple copies of certain resource materials which may be borrowed by a class. If the teacher desires, and it is possible, each student may study his personal copy of a pamphlet for a maximum of two weeks. Such bulk requests should be directed to the Project Staff.

The material listed below was obtained free of charge. The teacher or school librarian may obtain permanent copies for their building or classroom by directing requests to the following agencies.



1. "Air Pollution Explained: The Pollutants"

   National Tuberculosis & Respiratory Disease Association

   (brochure on the pollutants, their possible source, and some solutions.)

2. "Air Pollution: The Facts"

   Lewis - Clark TB & Res. Ass'n
   P.O. Box 158
   Wood River, Illinois 62095

   (brochure with general information)

3. "Clearing the Air"

Committee on Public Affairs
American Petroleum Institute
1271 Ave. of the Americas
New York, N.Y. 10020

(gives types of air pollutants, some history and control effects)

4. "Everyday Facts About Air Pollution"

Manufacturing Chemists Ass'n
1825 Connecticut Ave. N.W.
Washington, D.C. 20009

(history of air pollution and community efforts to solve the problems)

5. "It's Your Problem - Air Pollution"

Lewis - Clark TB and Res. Ass'n
P.O. Box 158
Wood River, Illinois 62095

(a fold-out cartoon brochure)

6. "A Primer on Air Pollution"

Mobil Oil Corporation
150 East 42nd Street
New York, New York 10017

(presents problems with fossil fuels and air pollution)

7. "True & False Quiz on Air Pollution"

Committee on Public Affairs
1217 Ave. of the Americas
New York, New York 10020

8. "What's Your Air Pollution IQ?"

Lewis - Clark TB & Res. Ass'n
P.O. Box 158
Wood River, Illinois 62095

(short quiz)

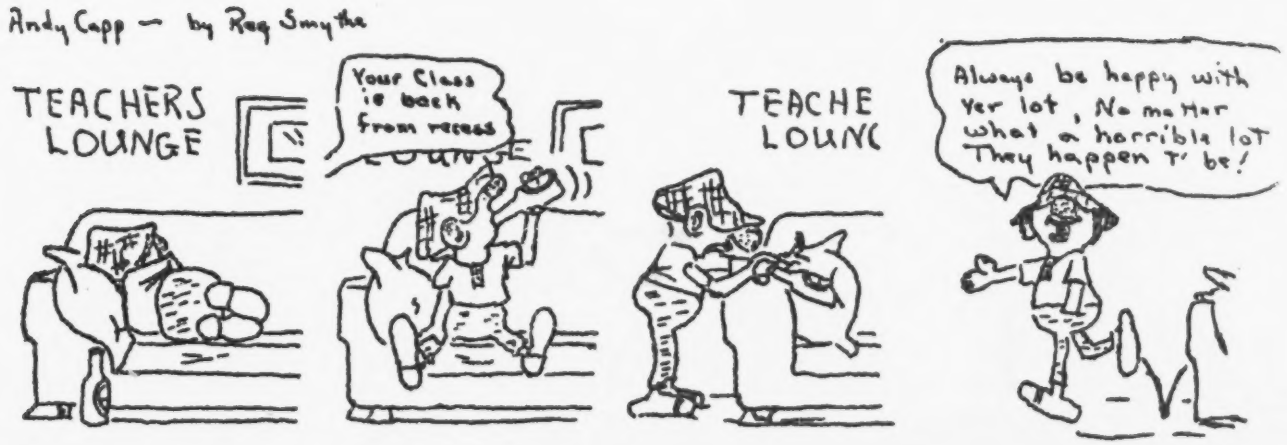
9. "When Air Pollution is Heavy"

Lewis - Clark T.B. & Res. Ass'n
P.O. Box 158
Wood River, Illinois 62095

(very small paper giving advice to people with respiratory diseases)

10. "You Can Help Keep Air and Water Clean"

Humble Oil and Refining Company
Public Relations Dept., Room 4192
P.O. Box 2180
Houston, Texas 77001


Andy Capp — by Reg Smythe
TEACHERS LOUNGE
Your Class is back from recess
TEACHE LOUNG
Always be happy with yer lot, No matter what a horrible lot They happen t' be!

C. Experts in the Air

The following is a listing of possible resource people and their titles. You may want to contact one of these resource people concerning questions you have or the possibility of their speaking to your class. You may also want to contact your local high school concerning students qualified to speak to your class.

Jersey County

Dwight Brass, Illinois Environmental Protection Agency:
Division on Air Pollution
Champaign, Illinois Phone: 217-333-8361

Macoupin County

Dwight Brass, Illinois Environmental Protection Agency:
Division on Air Pollution
Champaign, Illinois Phone: 217-333-8361

Madison County

Paul Hawkins, Madison County
Sanitation Officer
Madison County Court House
Edwardsville, Illinois 62025
Phone: 618-656-0913

Joe Nash, Engineer
Laclede Steel Corporation
Alton, Illinois 62002
Phone: 618-462-9731

Gary Rust, Sanitary Engineer
Illinois Environmental Protection
Agency; Division on Air Pollution
1800 St. Louis Rd.
Collinsville, Illinois 62234
Phone: 345-0368

George Sample, Engineer
Shell Oil Corporation
Wood River, Illinois 62095
Phone: 618-254-7371

Ed Sullivan, Engineer
American Oil Corporation
400 S. Main
Wood River, Illinois 62095
Phone: 618-254-7351

Dr. J. Edmund White
Chairman of Alton Ecological
Control Committee
Chemistry, Southern Illinois
University
Edwardsville, Illinois 62025
Phone: 618-692-2042

D. "I See and I Remember..."

The following is a listing of free films which may be obtained if a teacher so desires. The films may be borrowed from the sources given below with the only cost involved being that of return postage. All films are in color except those designated by (*) asterick.

TITLE OF FILM	SOURCE OF FILM	LENGTH
"Tom Leher Sings Pollution" (excellent introduction to water and air pollution)	The Department of Conservation Film Loan Service 113 State Office Bldg. Springfield, IL 62706 Phone: 217-525-7453	3½ min.
"Air Pollution - Part 1" (nature of the problem and why control efforts have been inadequate)	Same as above	12 min.
"A Matter of Attitudes" (interviews with people concerning air pollution)	National Medical Audio-Visual Center (annex) Section K Atlanta, GA 30324	30 min.
"Air is for Breathing" (pollution levels and pollutants in cities)	Shell Film Library 450 No. Meridian St. Indianapolis, Indiana 46204	31 min.

TITLE OF FILMSTRIP	SOURCE OF FILMSTRIP	LENGTH
"Faceless Menace" (awareness of, history and action against air pollution)	Technical Audio Visual Branch Office of Technical Information and Publications Technical Center Research Triangle Park, North Carolina 27709	